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FOSSIL SPLIT-TAILED FISH

Rare Find Made in Nebraska

by John E. Hufford

A fossilized fish found in Pennsylvanian shales in a quarry some seven miles south of Plattsmouth, Nebraska, by David Brown, age 15, is now being proudly displayed in Morrill Hall, at the University of Nebraska State Museum. David made a special trip to Lincoln recently to present the specimen to the Museum.

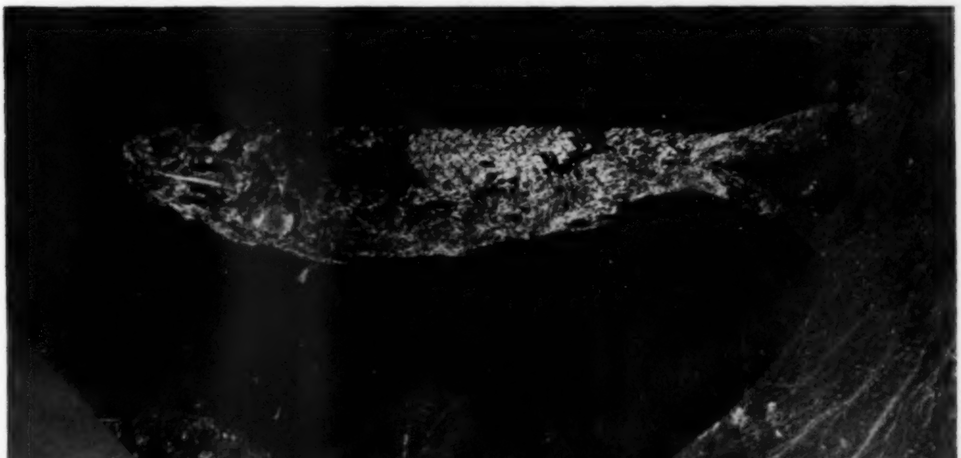
Dr. C. Bertrand Schultz, director of the Museum, said the specimen is one of the most complete and possibly the best preserved fossil fish ever found in the state of Nebraska.

Other such fossils have been found near Plattsmouth, he said, but none which would match the completeness of this find. It is an ancestor of fish, living in the same region today, and the type which is easily recognizable by its split tail and scales on the upper half of its tail fin. The fish resembles a small trout, except for an oddly split tail.

"It is interesting to note," Dr. Schultz added, "that this find coincides with the one hundred fiftieth anniversary of the Lewis and Clark Expedition, which found north of what is now Omaha the first fossil, a fish, uncovered in this area." Dr. Schultz said the find will stimulate further work in the Plattsmouth area to learn more of the ancestry of modern fish, about which too little is known.

The fish in question lived in the oceanic waters which covered most of what is now Nebraska many millions of years ago, and when it died its remains were trapped on the muddy bottom of the sea to be miraculously preserved until the present day. A conservative age of the fossil would be perhaps a quarter of a billion, or some 250,000,000 years, "give or take" some 50 million, either way for probable error in calculation.

While most boys his age are out fishing



Rare Fossil Split-tailed Fish found in Plattsmouth Shales. Photo by C. Bertram Schultz

with "hook and line," David fishes in the unconventional way, with hammer and chisel. Of course we are not saying David doesn't like to fish with live bait, but from now on he will have a reputation of another kind to maintain. Someday he may even make geology his career.

DAVID BROWN, age 15, makes rare catch.

David discovered his eight-inch long fossil after he struck a piece of shale with his pick axe. The shale split easily revealing the embedded fossil, both sections showing the impression of the fish almost perfectly preserved. The block of shale in which the fish was found weighed approximately 25 pounds.

The "lucky happen-stance" took place during a late fall field-trip made by members of the Nebraska Mineral and Gem Society, of Omaha, and the event was reported by the Society secretary Mr. John E. Hufford, who states for the record, that the fish found by novice Brown, as well as shark's teeth found by other members of the party, were in the Queenshill shale of the Lecompton stratum of the Pennsylvania formation. It was during this general period of the Earth history that much of our most important coal deposits were laid down.

FINDERS KEEPERS? HUGE AQUAMARINE

Back in 1945, Altive Lopes da Silva, a Brazilian diamond hunter found a huge aquamarine of gem stone quality, weighing 55 pounds, in Minas Gerais, Brazil.

One large mass, weighing 11 pounds was broken off at the time of its discovery and sold. The balance of the stone, worth perhaps millions, was taken to New York, where it has been in the hands of the Brazilian commercial office, pending the disposal of litigation concerning its ownership.

A prospector, Lair Ramos, claimed that the aquamarine mass was found on a claim owned by him, and at once began civil suits to obtain possession of the valuable gem-stone.

A year ago Altivo was convicted of illegally removing the stone from Brazil, and was sentenced to one year in prison on the charge of smuggling. Only recently the decision of the criminal court was quashed upon the plea of four attorneys, but not before the case appeared to be headed for the Federal Supreme Court.

After trying for nine years to win undisputed possession of this prize find, it has at long last been awarded to Altivo its original finder, and now of course all gem connoisseurs are anxiously awaiting the matter of its final disposal.

OUR COVER PHOTO

For this striking picture of ski trails being made at Glen Cove near the blue-topaz location on the slopes of Pike's Peak, Colorado, we are indebted to Professor Richard M. Pearl, of the Geology Department of Colorado College, Colorado Springs, Colorado.

Professor Pearl, who is a staff member of the Earth Science Digest, has written many excellent and widely published articles upon a great variety of geological subjects, and is the author of POPULAR GEMOLOGY, a recent authoritative volume on the World of Gems, which has had large distribution.

MOUNT MONADNOCK

What is a Monadnock?

by Mrs. Julian Wetherbee, Keene, New Hampshire

Monadnock Mountain in New Hampshire. The name is derived from the Indian m'an, meaning "surpassing," and, "mountain," and ock, "place"—place of surpassing mountain. (From U.S. Geological Survey Bulletin No. 258.)

Webster's International Dictionary, 1900, gives "Mt. Monadnock, a hill of resistant rock standing in the midst of a peneplain." The Encyclopaedia Britannica 1910-1911. Monadnock, a term derived from Mt. Monadnock in New Hampshire, to denote the "isolated remnants of hard rock which remain distinctly above their surroundings in the late stages of an erosion cycle."

The height of Monadnock given in 1906 by the U. S. Coast and Geodetic Survey is 3,186 feet. A map made by Dr. William Douglass, which was published after his death in 1753, called this mountain "Menadnock Hills." The name has been spelled over twenty different ways. Some are Manadnuck, Monadnoc, Manudnock, Manadnach, Wanadnock and the way it is spelled today Monadnock.

Back in Colonial times Monadnock was thought to have been of volcanic origin. Others thought a great flood had washed away the surrounding land, leaving Monadnock standing. The value of the summit as a conning tower was known to the Indians and early Colonists' scouting parties also used the mountain.

In the early days the top was covered with a forest growth which was destroyed by fires. Some of these fires were set to drive out the wolves that lived on the mountain with dens in the rocky hill sides. After the fires the loose top soil was quickly washed into the lower depressions. Although the top looks bare, from the distance, today there is plant life in the crevices and depressions among the rocks.

A storm is preceded for several hours by a roaring of the mountain, which may be heard ten to twelve miles. This is frequently observed by people who live near the mountain. It is also said that when there is perfect calm on the south side, there is sometimes a furious wind on the north, and in winter it may drive the snow so that it is seen whirling far above the trees.

Back in 1792, History of New Hampshire, by Jeremy Belknap, he refers to Monadnock as, on its summit is a bald rock, some parts have large piles of broken rocks. Black lead (plumbago) is found, also small specimens of copper and lead have been seen.

In the late 18th century graphite was mined and at one time, it was thought gold was found which turned out to be fools gold or pyrites.

In the fall of 1905 the State acquired complete title to Monadnock State Forests. Under terms of the Forestry Act of 1893, reserves thus acquired are to be forever dedicated to the public for park purposes. Accordingly, the Monadnock Reserve has been thrown open to the public use.

From the summit on a clear day, to the north the peak of Mt. Washington 105 miles off, to the north west Mt. Mansfield mightiest of the Green Mountains 121 miles away, nearer peaks of Mt. Tom, Holyoke, Blue Hill, Ascutney, Kearsarge and the Custom House Tower in Boston, and many more points of interest may be seen.

Emerson wrote, on a trip with a party up Monadnock in 1866—while the party was upon the mountain, planning to stay the night, a storm came up. He with two friends found a shelter in the rocks, soon a large brook roared between the rocks, just below their feet. There were four young ladies in their party of nine. Emerson and

Storey descended the mountain with the four girls (one was Emerson's daughter) to the Mt. House for the night. The storm continued all night. Next day they again climbed the mountain.

Monadnock has been the inspiration for many poets as well as artists. Besides Ralph Waldo Emerson, James Russell Lowell, Oliver Wendell Holmes, John Greenleaf Whittier, William Ellery Channing, Kipling, Mark Twain and Thoreau all found it a fitting subject. Emerson, Channing and Thoreau climbed the mountain many times. Holmes in 1872 wrote, "The Grand Monadnock, a mountain in New Hampshire which I myself have seen from the top of Bunker Hill Monument."

On close study of a topographic map you will find not one single peak but two well-defined parts. The western part on which is the summit rises 300 to 400 feet higher than the eastern end of the ridge. From Geology of New Hampshire—'In structure it (Monadnock) seems to be a double synclinal. A contorted synclinal of andalusite mica schist.' In these recrystallized rocks that make up the schist no fossils are found, but graphite points back to some organic remains.

The first rock encountered on going up the mountain road, is a rusty, laminated muscovite biotite schist. Iron pyrites stain this schist. It also contains small scales of graphite.

The schist is in three marked variations. On top of the mountain and on the eastern ridge, it is gray garnetiferous, biotite, sericite schist. The biotite is in isolated scales, set in a light gray schist which also contains some andalusite crystals or pseudomorph of andalusite. Some of these crystals are 5 to 6 inches long by half an inch wide. On some surfaces these crystals appear in relief, the other rock having been weathered away.

In the middle of the north east slope the schist does not contain fibrolite or andalusite, instead you find a dark green mica and a very fine sericite. While on the southern half of the ridge, and on the western part

View of famous MOUNT MONADNOCK near Keene, New Hampshire of the mountain glassy white fibers of fibrolite is found.

On the northern part of the eastern ridge, also other places on the mountain can be found andalusite crystals changed to masses of pearly white sericite scales.

In the southern part of the ridge the schist is a fibrolite schist, distinctly laminated and contains garnets and tourmalines. Lower on the mountain quartzose-mica schist, besides the granular quartz a fine brown mica and light green hornblende are found. As you get away from the schist the granite gets lighter in color and with more muscovite and less of the other minerals, it is more crystalline feldspar, quartz and mica. In some places it is hard to find the dividing line between the granite and schist.

In the area are granite masses. Where it comes near the rusty schist it is dark gray in color but rusty on the weathered surfaces. The quartz and feldspar is a granular mixture, with biotite and muscovite varying in quantity. Tiny magnetite and brown titanite crystals occur in this granite along with secondary epidote. It contains some black tourmaline but this is found oftener in the schist. Sericite is also found in the granite.

Before Professor Louis Agassiz of Harvard began studying the glaciers, geologists had been of the opinion marks on the rocks were caused by a vast flood. Now geologists know these gouging and sculpturing marks have been caused by the glaciers that once covered this area. The glacial striae are in a southeast direction.

Professor Davis said, "The glacial action is a more important factor in geographical development, than the Indians ever were in historical development." It was Davis who suggested Monadnock be adopted to represent all mountains of this type, prominent isolated remnants of the erosion period. This suggestion has received wide acceptance among geologists. Now all such mountains are called monadnocks.

Extracts from two of Emerson's poems referring to the Mount are:

"Every morn I lift my head
See New England underspread,
South from St. Lawrence to the Sound
From Katskill to the sea-bound"

* * * *

"A score of airy miles will smooth
Rough Monadnoc to a gem."

Monadnock Agenda:

It has been said amethyst crystals are on the mountain but I've never talked to anyone who knows where they are, or seen any of the amethyst. The story goes, a number of years ago a hunter came upon this small cave (probably only a large pocket) which was lined with amethyst. Since that day he has tried to find the place and as far as I know never succeeded.

The Monadnock Mineral Shop is on the main highway from Marlboro to Jaffrey, where the road circles nearer the mountain on the southwestern side of Mt. Monadnock. J.W.

William H. Bond *becomes new* *Earth Science Digest Associate*

It is with much satisfaction that we are enabled to announce that Mr. William H. Bond, of Chicago, Illinois, has become an active associate in the management group of five men sponsoring the publication of Earth Science Digest, filling the vacancy created on the death in September of our late Editor Dr. B. J. Babbitt, of Riverside, Illinois.

Mr. Bond has for many years been closely associated with the printing and publication business in and about Chicago, and will bring his rich experience in this field to the Digest which will no doubt be greatly benefited thereby. He will be actively associated with Dr. Willems in the business management and development, and will also cooperate in building circulation.

THIS MATTER OF JUVENILE WATER!

Editorial Comment

We have had some inquiry regarding the article on "Juvenile Water" published in our January issue. It appears that a majority of amateur geologists seem never to have heard of it, and hence the question, "what is Juvenile Water?"

Most folks, perhaps, in thinking of water, think only of the water in the clouds, or on the Earth's surface as the oceans, lakes and rivers, although some may even be conscious of the existence of ground water, especially in these days of receding water tables.

The water question is not nearly as simple as that, and in fact, water is indeed, by far our most important mineral. (Yes! Being a substance of natural origin having definite chemical composition makes it a mineral.) It is important in so many ways that many entire volumes might be written upon the subject. Approximately four hundred million cubic miles of water rests upon the Earth's surface.

It was once thought and taught that as the Earth originally cooled much if not all of the water came down out of the skies, in torrential rain storms which lasted for many ages. At present, however, we are beginning to realize that vast quantities of water, locked up within the Earth's interior also came up to the surface from below, out of the rocks or the solid portion of the Earth, and that probably this process still goes on, more slowly perhaps, but unabated since the beginning of time.

It is this water, existing within the Earth which, perhaps never yet having seen the light of day, that is known as "Juvenile Water." Its great importance can no longer be ignored or escape our attention. These deep seated magmatic waters have much to do with the matter of thermal springs and volcanism, and their distinction from superficial or vadose waters associated with the meteoric cycle can now be closely drawn.

When a crystalline rock, like granite, is heated to redness in vacua, water and gases, the latter identical in character with the volcanic gases, are given off. For instance, to cite the least significant example, according to Gautier, 1 cubic kilometer of granite can yield from 25 to 30 million metric tons of water, which at 1,100 degrees temperature would form 160,000,000,000 cubic meters of steam, and in addition, to this enormous volume of vapor, 28,000,000,000 cubic meters of other gases would be emitted.

So, from facts such as these, it will be seen that the existence of enormous quantities of "Juvenile Water," at considerable depths beneath the Earth's surface, is no mere figment of man's imagination, but is actually a reality which must be reckoned with whenever one stops to give serious thought to the true nature of things.

N.B. For those who may wish to delve more deeply into this interesting subject of Juvenile Waters, we recommend that they read "The Origin of Sea-Water", a masterful paper prepared by Dr. Herbert B. Nichols of the U. S. Geological Survey, and published in the December 1950 issue of Earth Science Digest, copies of which are yet available. Postpaid 35c.

EARTH SCIENCE QUIZ NO. 11.

TEST YOUR KNOWLEDGE! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect. Answers Page 25.

a.—(1) marcasite
b.—(1) drift
c.—(1) selenite
d.—(1) fault
e.—(1) dolomite
f.—(1) placer
g.—(2) enhyros
h.—(2) hardpan
i.—(2) iridescence
j.—(3) centrosphere
k.—(3) isostasy
l.—(3) nacre

The GREAT REPTILES: — Dinosaurs

by Jerry E. Garrison, Boulder, Colorado

Many people think of Ally Oop when they hear the word dinosaur or any phrase connected to dinosaurs. It's good cartoon, but it's misleading. The dinosaurs lived at least 59 million years prior to man. No human ever observed a live dinosaur. Although man has never seen a live one, vertebrate paleontologists have worked laboriously for years in order to unravel the strangest story of time. They have excavated and pieced together petrified bones of these giant reptiles of the Mesozoic Era. Today we can visit museums to be carried 100 million years into the past and study these freaks of nature.

The Mesozoic Era was the time and setting for the dinosaurs — 200 million years to 60 million years ago — which is the "Age of The Reptiles." When the Mesozoic Era started the Earth was already 1.8 billion years old. Life had ascended from the one-called animals that dominated the Proterozic Era to the invertebrate animals (clams, snails, and crustacea) during the Lower Paleozoic Era. In Middle Paleozoic the fish became dominant in the seas. The fish in turn gave rise to the amphibians, and the amphibians in turn were ancestors of the earliest reptiles of late Paleozoic. The reptiles were evolving at the same time as were the amphibians; therefore there was constant rivalry between the two at this time. Thus, finally the reptiles were victorious, and the Mesozoic Era began with the reptiles the dominating animal of the Earth.

The Environment

The climate was mild and equitable as proved by the numerous varieties of ferns, cycads, ginkos, and rushes abundant in the low swampy basins and valleys. The higher areas were undoubtedly covered by extensive forests of evergreens. This tropical environment extended far north — up to 70° latitude — because rocks in Alaska bear undisputable evidence of tropical plants. Furthermore, it is doubtful if long extensive ranges of high mountains were present (probably low indistinct ranges similar to the present Appalachians were present). High mountains influence the weather and tend to make a colder climate. Therefore, if we find tropical plants widespread mountains were not abundant nor high.

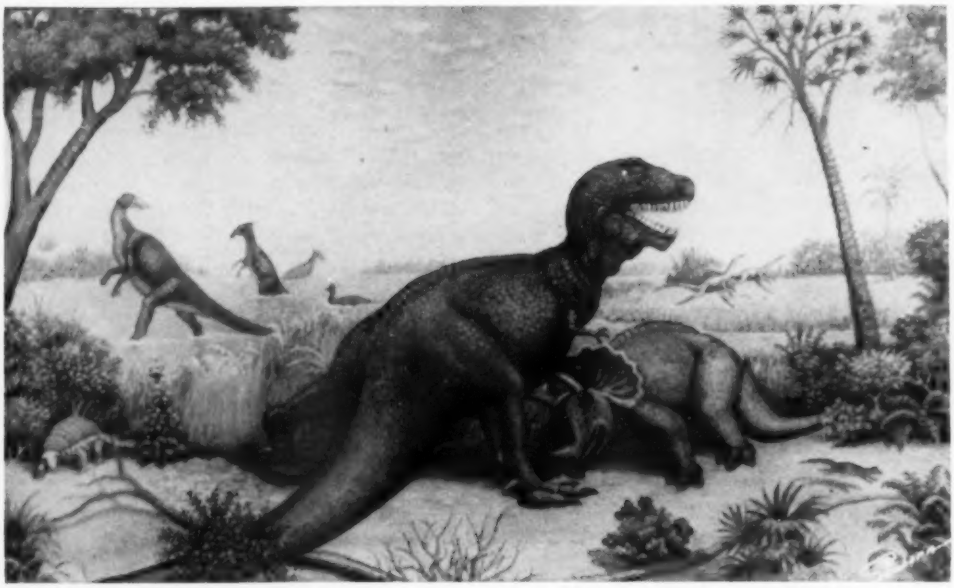
The whole area of Wyoming, Colorado, and Utah was an area not unlike the Amazon Basin of South America. Wide meandering streams flowed into epieric seas*. Swamps, marshes, and lakes were numerous in the valleys. The shallow seas probably came up from the south and invaded the low lands as far north as middle New Mexico. Other seas came down from the north into Wyoming. Again the seas stabilized the weather. They held the temperatures stable and provided abundant moisture for the tropical environment.

From all of this evidence we may conclude that the following setting was prevalent throughout the Mesozoic time. This setting was conducive to the growth of the dinosaurs to such immense dimensions. Shallow basin with undulating hills. Swamps and marshes were abundant. Rivers were wide and sluggish. Vegetation was soft and succulent and thick. The humidity was high, and the temperature ranged from 75° to 85°F.

*Epieric Seas are shallow bodies of water not over 600 feet in depth that have invaded the continent from time to time in the past.

General Appearance of the Dinosaurs

Dinosaurs weren't all monsters as is commonly believed. Some were no larger than a large jack rabbit. On the other hand, many were up to 85 feet long and weighed upwards of 40 tons



TYRANNOSAURUS battling a TRICERATOPS, left foreground is an ANKYLOSAURUS, in water are types of DUCK BILLED DINOSAURS. Photo courtesy Utah Museum of Natural History.

— some authorities believe the pituitary gland caused giganticism in these large reptiles. All dinosaurs had an exceedingly small brain. The average brain size was about one pound to 50 tons of body. Often times to supplement the small brain, dinosaurs had enlargements in the spinal cord near the hip region. These enlargements probably served the remote rear extremities for reflexes and touch and maybe other unknown functions. The nature of the skin is known except in rare cases, and the color of the skin is obscure. However armor plates existed on some species and is preserved so we are familiar with it. All dinosaurs presumably laid eggs similar to reptile eggs of today except that they were larger. Most dinosaur's front legs were shorter than the hind pair. This evidently points to a common ancestor that was bipedal (two legged). The necks, tails and heads of the dinosaurs were different accordingly to there specialization.

THE SAURICIANS

The Sauricians are an order of distinction because they include the huge four footed Sauropoda — *Biontosaurus* and *Deplodocus*, and the bipedal carnivorus or Theropoda — *Tyrannosaurus* and *Allosaurus*. The ancestor was a two legged reptile. The Sauropoda evidently reverted to a plant eating habit and spent most of their time in and around water. The bipedal carnivorus made little change from the same ancestor except for specialization of the legs for pursuing prey and in turn were restricted to land.

The Cretaceous *Tyrannosaurus* was the most ferocious carnivore of all time. It stood 18 to 20 feet high and was 45 feet long. The hind legs were massive and used for a fast bipedal gait by which he pursued prey. Bird like feet left similar tracks but of course much larger in size. A long thick tail was used to balance the fore body much like the present day kangaroo. The head was large and powerfully constructed in order to rip and tear huge masses of flesh. The jaws were equipped with long sharp teeth that curved in toward the mouth cavity, and the teeth were serrated on the edges to make them knife like. The teeth often attained the length of six inches. The *Tyrannosaurus* was over specialized in that his two front legs were utterly useless for eating or defense. The legs had shrank so much that they wouldn't reach the mouth nor were they strong enough to offer any defense. The beast wasn't an extremely heavy animal. At best his weight was in the neighborhood of 10 tons, which isn't overly heavy for a dinosaur.

The typical Sauropod developed into a herbivorous animal, and in turn developed into the largest land animal ever known. At the extreme attaining 40 tons of mass and being up to 87 feet long. The Sauropods were massively built. The backbone was specialized to act as a structural girder being hollow in unique places to reduce the overall weight. The legs were pillar-like construction to afford a substantial limb to hold the beast up. The legs were under the body in post-like fashion in a vertical position. All Sauropods had long whip-like tails and nearly as long a neck. On this neck rested a small poorly developed head. It was much out of proportion to the body being only one to two feet long. Some authorities question the fact as to how they were able to take in food enough to satisfy or sustain the body. The teeth were pencil-like pegs and in most cases were blunt.

The *Diplodocus*, a Sauropod, is a peculiar dinosaur—like the *Beontosaurus;* but it has some very strange specializations. The teeth are long and pencil shaped and are scattered in a fashion like a rake. He is thought to have gathered clams with this strange set of teeth by raking the bottoms of the rivers and lakes. Also the joints of big legs are very poorly developed. Instead of a true ball and socket, the joints seem to have been cushioned by a pad of cartilage. Therefore it seems plausible that this reptile never ventured out of the water.

The *Brontosaurus* another typical Sauropod seems to have been better developed for terrestial life. His legs and joints are much better developed. The legs are sturdier and possibly would hold him up on land. The teeth of the *Brontosaurus*, also seem to be better adapted to eating vegetation. Therefore, it is possible that the *Brontosaurus* spent some time out of the water, more than likely in swamps and marshes.

STEGOSAUR battling two ALLOSAURUS. Two large SAUROPODS in the background. Picture, courtesy of Utah Museum of Natural History.

THE ORNITHISCIANS

The Ornithiscians were a distinct order containing varied types of plant eaters. They had a tieradiate pelvic girdle (one with three points) which is similar to the pelvic girdle of birds. These dinosaurs also had a bipedal ancestor common to the Saurischians. Several groups reverted to quadrapedal motion and evolved into the highly armored dinosaurs. Other groups reverted to quadrapedal motion only partially. Hence the most bizarre types belong to this order and are truly the most interesting to study. In size they were considerably smaller than the Saurischians, and undoubtedly they were never as large. The front legs of the bipedal types weren't shortened as much as the bipedal Saurischian types, and probably they never were fully two legged. They more than likely used these front legs as a rest and often came down on all fours to eat vegetation.

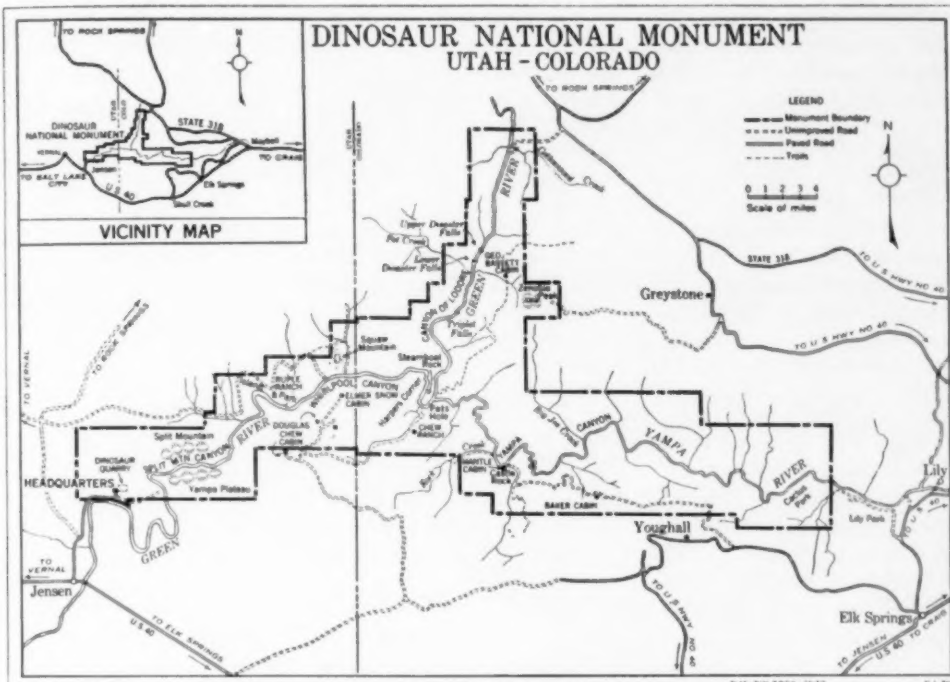
The bipedal forms are the duck-billed dinosaurs (*Hadrosaurs* or *Trachodonts*). They had well developed webbed feet which were used for propulsion in the water or support on the bottom in muck and to walk on swampy surfaces. Long flat tails were prominent, these being used for locomotion in the water also. Their head was most unique in that they had elongated jaws not unlike the ducks beak or very similar.

The *Stegosaurs* were the slow moving ouadrapedals. They developed a dorsal armor along their spinal column. Two rows of plates vertically arranged down the back. The plates were not paired, consequently bilateral symmetry was absent. The rows of plates weren't used in attack, but they acted as protection for the back bone and spinal cord. How efficient they were remains unknown. The head was useless except for eating soft succulent plants, seeing, and hearing; for it wasn't much larger than the tail. The head housed a brain, which is more unique, in being extremely small. However to supplement this small brain in the sacral region an enlargement in the spinal column was 20 times larger than the brain! Evidently the brain was too small to serve the complete body and needed a booster for the rear part. At the end of the Stegosaur's tail was a pair of sharp spikes. These were evidently used to thrash around in the presence of an enemy, serving to catch a vulnerable spot and rip it open or to discourage an attack.

The *Ankylosaurs* were truly a different type of armored dinosaur. They were broad and squatty in appearance somewhat resembling the armadillo of South America. This walking fortress has a mosiac of bony plates which formed an efficient carapace. Along the sides spikes projected for defense against a broadside collision. The legs were short and stout. Undoubtedly when this creature was subjected to attack, it merely squatted until the havoc was over. The neck was short and thick with the head carried close to the body.

The horned dinosaurs of which the best known is the *Tricerotops* attained a length of perhaps 20 feet. The skull is the most unique in this group. They had a wide flaring bone from the skull which extended back over the short neck to the shoulders, also three horns, a pair over the orbits of the eyes and a third in the nasal region. These must have proved to be an effective ramming device. The skull often attained the length of one-third of the body. The rest of the body was normal. A short thick neck was hid under the flare. Hind legs were longer than the front legs. The tail was of normal proportions. Altogether the total length was 20 to 30 feet and about 8 feet high at the shoulder.

The dinosaurs seemingly originated in early Triassic Period (200 million years ago) from a primitive branch of thecodont reptile. They were primitive looking reptiles resembling lizards. Except that the front legs were smaller than the rear legs. They had a bipedal tendency. The early ancestors of the dinosaurs averaged 3½ feet long. The Ornithiscia probably branched off the thecodont early in the Triassic Period. During the lapse of time they were



Map: Courtesy of the U. S. National Park Service

probably developing into distinct orders, the species of the ornithiscia were not discovered until Lower Jurassic. The Stegosaurs were first discovered The duck-billed dinosaurs came Cerotopsia (horned dinosaurs) made their bid in Late Cretaceous. The Saurischians branched away from the thecodont stock in Early Triassic. After a lapse of time the Sauropods and Theropods became distinct groups and are first found in Early Jurassic. The above paragraph may be confusing. In many cases we can only theorize that the ancestor is in the thecodont reptiles because of structural similarities. Now being that the thecodont specimens are found in Early Traissic and distinct dinosaur specimens of different orders come at a later date in which there is a great gap, presumably the gap is taken as the amount of time necessary for the distinct orders to evolve.

Extinction of The Dinosaurs

Sixty million years ago at the end of the Cretacious Period the Mesozoic Era came to end. Along with this ending the dinosaurs and many other archaic forms of life ceased to exist—presumably extinct. The basins were full of sediments. The land was flat and level due to the erosion throughout the Mesozoic Era. Then came the climax. Great compressive forces in the Earth's crust, which had lain dormant for 140 million years, buckled the Rocky Mountains and the surrounding area up in elevation between 20 and 30 thousand feet. This uplift was not all at once, but it consisted of a series of uplifts. After being elevated to this height, the area naturally became colder. The epieric seas drained into the ocean. The temperature due to these conditions fluctuated greatly and seasonal changes took place. The climate was no longer stable. Cold fronts hovered in the high areas and glaciers formed. The conditions transformed the tropical basin into a temperate if not an alpine climate. Hence the once abundant tropical ferns, cycads, and other succulent plants died. Harsh grasses and deciduous plants took the place of the tropical growth. The Angiosperms assumed priority in the low lands. This robbed the herbivorous dinosaurs of their food supply. Due to the colder seasons the dinosaurs had to migrate or hibernate as reptiles do today. Unfortunately they were much too large to do either, and they were left to the mercy of the weather. Low temperatures make reptiles very sluggish or immobile. Mammals being much quicker probably ate great quantities of their eggs. All in all the dinosaurs were simply over specialized, and they died because their environment changed, and they were unable to change with the environment.

For further reading:

"VERTEBRATE PALEONTOLOGY" by Alfred S. Romer, University of Chicago Press, 1933.

"THE DINOSAUR BOOK" by Edwin H. Colbert, American Museum of Nat. History, 1945.

For all who have enjoyed reading the above article on Dinosaurs by Jerry E. Garrison we recommend "Digging For Dinosaurs" by Horace G. Richards, of the Philadelphia Academy of Natural Sciences, published in Vol. II—July 1948, of the Earth Science Digest. Single copies are available. Postpaid 35c.

A MOVE IN THE RIGHT DIRECTION

What appears to be a mighty smart move was recently made by the officers and members of the *Puget Sound Gem and Mineral Club of Seattle, Washington,* which should meet with the approval of all good mineral fans, everywhere.

"The Club has filed on four mineral claims on the top of Red Top Mountain, near Liberty, Washington, and we are therefore very proud," reports Frances L. Thompson, the Club's publicity chairman, "to be able to offer free digging and hunting on our claims to rockhounds from all over the United States. This action was instigated by a rumor that outside interests were planning to obtain the Red Top area and charge a fee for hunting, as is done in so many places nowadays."

"We hope to have a cairn placed in a strategic place on each claim, where visitors may register, telling us when and how long they enjoyed our hospitality. Red Top is one of the best known productive areas in Washington, probably second only to the Saddle Mountain petrified wood area, and there has been some excellent crystals and agate brought out—the agate being mostly blue and lavender."

It is hoped that many other clubs will follow this splendid example of altruism, and this should be one type of project definitely to be encouraged by all of our Federations.

TIEMANNITE and ONOFRITE and the "Lucky Boy" Claim
by Robert Root

How many collectors have specimens of the above in their collection? While they may be rare they are certainly not pretty. Tiemannite is a mercuric selenide while Onofrite from Marysvale, Utah, according to my authority, has been shown to be a mixture of tiemannite and sphalerite. This is not clear to me as just before this it reads "with tiemannite from Marysvale." This does not really matter as in any event such a mixture would be of rare occurance.

When I returned from the show at San Diego I had the wrong idea of mining at Marysvale. I had heard so much about this locality that I was under the impression that most of the metal mines were yet working. Instead, I found that most of them are shut down. There on the Deer Trail group extensive diamond drilling was being done. I asked Mr. Millhern, in charge of the Deer Trail, for permission to visit the mine and also to secure some of the minerals from there. He was very kind and arranged for a friend of his, Bert Wetzill (I may be wrong about the spelling of Bert's name) and me to go up late in the afternoon with his foreman and the cat-skinner who was putting in a road to move the drilling rig. On the way Bert told me about the "Lucky Boy" claim, one of the claims in the Deer Trail Group.

The "Lucky Boy" mine, he said, which was the source of tiemannite and onofrite was but a large surface pocket that had been worked out 20 years ago. It was worked by means of an inclined trough that carried the ore down to a loading platform. From here it was taken to Cottonwood Creek where it was retorted to recover the quicksilver. He knew no figures on the amount mined, but it must have been tremendous. In a few minutes I would be seeing the mine from which some of my specimens came and to me this was a great thrill. These specimens were a part of the Lazard Cahn duplicates and were mined many years ago.

After leaving the car, and a short and rough trip across and up the mountain side we reached the bottom of the dump and started looking for specimens as we climbed. I found a few pieces with small specks of tiemannite, and one that I thought would be fairly good judging by the weight, and Bert also found several good small pieces. It must be remembered that this was but a small dump and all that could be lost of the ore would be the little lost in shooting and what spilled over the trough used to carry the ore down to the loading platform. Add to this the fact that the mine had been operated 20 years ago and many people had been over the dump before. I feel that I was lucky to get as much as I did.

After climbing up the dump we found the mine which was just a shallow depression in the mountain side, and at the best not over 50 feet, to judge by the bank of dirt piled up behind it. A tunnel had been driven into this bank coming out on one side. The dirt it is said carries signs of mercury. This was to be expected as quicksilver is such a slippery substance that some of it was bound to have found its way into the surrounding dirt and rock.

It is surely a wonderful thing that Nature made a deposit of so many tons of this rare mineral in this one spot. More wonderful when you remember that this had once been deep inside the earth. Only a few other small traces have been found near the "Lucky Boy," and as an ore it has been found in only a few places on the earth. I obtained some specimens from Bert to supplement the few I already had. Most of these had been found on other trips. I really got a thrill in seeing the mines from which my specimens had come. The sad part of this is that the specimens outlive the mine by many years. The oldest specimens I have, came to America in 1814 and many others are older than that.

After a pleasant evening visiting with the Millherns and Bert, talking and showing minerals, I left at daylight for Denver. All this goes to show what wonderful folks true rock-hounds really are, and their courtesies are really appreciated.

GEOLOGICAL HISTORY OF THE DEER TRAIL MINE

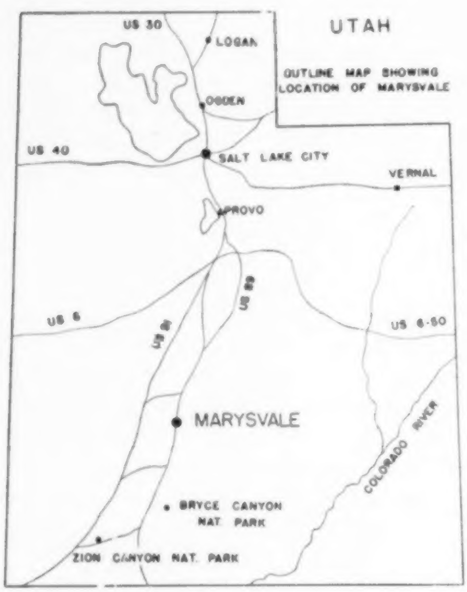
By Edmond P. Hyatt

The Deer Trail mine, five miles south and east of Marysvale in south central Utah, was opened in 1878 and became famous for rich lead-silver-gold ores.

The blanket to lens-shaped ore body parallels the nearly flat limestone and quartzite strata, the contact of which localized the mineral-rich solutions. The source of these ore bearing solutions was an east-west "porphry dyke" which cut the sedimentary strata north of the mine site. The metal bearing vein grades into milky quartz on the west and south.

Subsequent to the ore formation, which probably occurred beneath at least 2000' of sediments, the major Sevier Fault cut the area. This north-south normal fault had a displacement of some 3000' and formed the Marysvale "depression". The down thrown block likely carried a larger portion of the original ore body with it than was left on the footwall to be mined. The east edge of the vein was then covered by a thin layer of alluvium.

Ore bodies of the Pluto (silver) and Lucky Boy (mercury) mines located in the same lower Mississippian limestone and just a few feet from the main Deer Trail mine, are considered to have originated concurrently with the one described above.



Drawn by Edmond P. Hyatt

ESD readers will be interested to know that the Marysvale (pop. 500) district has had as varied a mining history as any in the country. The lead-silver-gold-mercury boom of the last century gave way to alunite for World War I. The alunite, an aluminum-potassium sulfate, was mined as a potash source when the German supply was cut off by submarines. World War II and its airplanes gave another shot in the arm to the otherwise uneconomical alunite production, this time for aluminum metal. More recently the atomic age has had its effect, for now Marysvale booms are due to uranium mining.

Reference: J. F. Gibbs, "The Deer Trail Mine, Near Marysvale, Utah," *The Mining Review*, Salt Lake City, Vol. 6, No. 22, Feb. 28, 1905, pp 19-20.

Reference: (Lucky Boy) — American Journal of Science, Vol. 121, pp 312, 1881; Vol. 129, pp 449-454, 1885.

GOLD QUARTZ (?) IN MINNESOTA (Sequel)

Seldom has any item stirred up more genuine interest than the letter written by Raymond E. Gatz, of Anchorage, Alaska, published in our January issue. Mr. Gatz's letter, which was written in good faith, concerning events as he remembered them, was prompted by our "Prize Question for November" telling of an early pioneer gold placer mining operation in Southeastern Minnesota, the answer for which may be read in an adjoining column. (Page 23)

Mr. Walter Rahn, of Lewiston, Minnesota, now writes that, "the mine Mr. Gatz had in mind was located about 25 miles west of Winona, being known as the Gainey Gold Mine. Mr. Gainey at that time owned the land where the mine was located, and according to my recollection this was around 1917-1918.

As I recall, shares were sold, a corporation was formed and misuse of the funds closed the mine. There was also a gold mine southwest of Winona, and I have an older brother who was in this mine about 50 years ago. It also was dug in the side of a hill, and the location would be about South of Goodview, or about one-half mile west of St. Mary's College. Why it was closed, I do not know.

"I was born at Winona, and grew up at Altura, and so I know this area well. If anyone would like further information or details, I could get it for them." (Thanks Mr. Rahn for this interesting bit of enlightenment.)

Further light on this aforesaid "Gainey Mine" has been furnished in a letter from Mr. Maynard R. Fleener of Rochester, Minnesota, and in order that we may "help keep history straight" we quote directly from it as follows.

"When I first came down here (1923, I believe) I remember the furor in the papers concerning this so-called mine. It seems that a bunch of sharpers wanted to turn some quick dollars and the dizzy twen-

(Concluded on Page 24)

CAMBRIAN TRILOBITA

First of a Series

James O. Montague
Honorary Curator Of Geology
Milwaukee Public Museum

Introduction

No form of life has appeared on earth until the environment necessary to its inception and maintenance was sufficient to sustain it. At the beginning of the Paleozoic Era, and the Cambrian Period, all land area was bleak, barren, and incapable of sustaining even the lowest form of vegetative or animal life; consequently, in the briny waters of the ancient seas only was it possible to conceive and sustain life.

Whatever life, if any, that might have existed at the close of the Proterozoic Era was in a stage of growth incapable of preservation in a fossiliferous form. Any conclusions reached regarding pre-Cambrian life is problematical. This leads us to the Cambrian period where the first fossil record of invertebrate life is readable in the sedimentary rocks.

The trilobita is the most important invertebrate that first appeared in the Lower Cambrian seas and became the dominant form of life for millions of years. The warm Cambrian seas covered the greater portion of the United States, a narrow strip in eastern and a wide section of western Canada extending from the U. S. border to the Arctic Ocean then northeasterly. into Greenland. Fossils from southeastern Newfoundland, Cape Brenton Island, New Brunswick, and parts of eastern New England, differ from those of other parts of the United States and Canada, but are practically identical with northwestern European Cambrian fossils; consequently, there must have been a free intermingling between eastern Canada, eastern New England and European faunas. A land barrier must have prevented the mingling of this Atlantic fauna with that of the North American interior.

This article deals entirely with Lower, Middle and Upper Cambrian trilobites as found in the American fossil deposits. The genera and species differ greatly. Some were very small with only two to five thoracic segments, large heads and pygidiums; others had up to thirteen or more thoracic segments, large smooth heads and pygidiums; still others had large heads with posteriorly extending spines and other special ornamentations on thorax and pygidium. The dorsal side was always covered with a hard chitinous exoskeleton but the ventral side was soft and vulnerable. Where the thoracic segmentation was sufficiently long, the animal curled up as a means of protection. The spines on some species may have been a hinderance to curling. Some species were blind, others possessed single or few faceted eyes, but the majority had compound eyes of many facets. Some species may have been scavengers and others may have been carniverous.

Prominent Species of Cambrian Trilobites

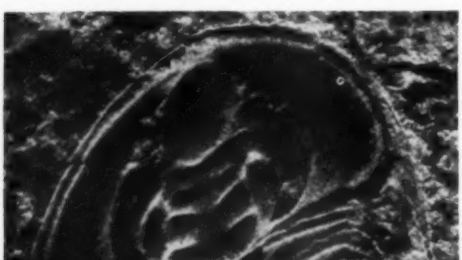
Practically all of the following descriptions are of index fossils:

Eodiscus speciosus, Ford—Lower Cambrian from New York. It had an oval shaped head, three thoracic segments, and an oval shaped pygidium larger than the head. The axial furrows extended deeply into the head and almost the full length of the pygidium. From all appearances this was a blind species.

Paedeumias transitans, Walcott—Middle Cambrian, Pennsylvania. This specie had a wide oval shaped cephalon with genal spines extending posteriorly half the length of the thorax; the glabella did not reach to cephalon rim; hoypostome was attached by stalk; a large pleural development of the third thoracic segment; all plurae were spined; A long axial spine extended posteriorly from the 15th segment; pygidium rounded.

Mesonacis vermontana, Walcott—Lower Cambrian, Vermont—this specie had a long slim overall appearance; wide oval cephalon; short genal spines; large pleural development of the third thoracic segment; short axial extended posteriorly from the 15th thoracic segment to almost the full length of the pygidium; eight small spined segments between the spined 15th and the pygidium; pygidium round. This specie is not listed as an index fossil but is illustrated by both Moore and Scott.

Olenellus thompsoni, Hall—Lower Cambrian, Vermont — Cephalon much wider than long; short genal spines; glabella lobe extended close to rim; eye lobes unattached posteriorly; thorax width reduced greatly to pygidium; large pleural development of the third thoracic segment; plurae spined to the 15th; large axial spine on the 15th; rudimentary segments posterior to the 15th; slightly rounded pygidium.



PAEDEUMIAS TRANSITANS, Walcott L. Cambrian, Fruitville, Penna.
"Milwaukee Public Museum Photo"

Zacanthoides idahoensis, Walcott—Middle Cambrian, Idaho—Cephalon oval shaped, wider than long; frontal glabella lobe touches rim; large palpebral lobes; three pairs of glabellar furrows; eyes large extended to rear margin; 14 spined thoracic segments; small oval shaped pygidium. Description from photo.

Paradoxides harlani, Green—Middle Cambrian Massachusetts — cephalon wider than thorax; rim wide pointed anteriorly; genal spine extended posteriorly from free cheek almost the entire length of thorax; glabella enlarged anteriorly with two pairs of furrows; large eye lobes; nineteen spined thoracic segments; small pygidium.

Orria elegens, Walcottt—Middle Cambrian, Utah—Oval shaped cephalon; Short genal spines extended from free cheeks; glabella extended to rim; eyes large; nine thoracic segments; large segmented pygidium with short axial lobe.

Agnostus interstrictus, White—Middle Cambrian, Utah — large cephalon wider than thorax; glabella pointed, one furrow; two thoracic segments; pygidium almost equals cephalon in size.

Crepicephalus, iowensis, Owen—Upper Cambrian, Mississippi Valley region—Cephalon slightly narrower than thorax; large genal spines extended from free cheeks; small eyes; tapering glabella; twelve thoracic segments; pygidium with four segments and two large divergent spines.

Cedaria minor, Walcott—Upper Cambrian, Utah—cephalon wider than thorax; genal spines attached to free cheeks, extended posteriorly to half the thorax length; medium palpebral lobes; glabella long rounded anteriorly; eight thoracic segments, smooth; pygidium oval shaped, segmented; axial furrows, prominent; marginal furrow, smooth.

Environmental Influence

The warm shallow waters of the Cambrian seas furnished an ideal environment for trilobite development and domination. The fossil record reveals a high degree of development in the Lower Cambrian and a continuation to the close of the Period. According to Moore at least 65 genera and over 200 species have been described from the Cambrian, and over 1000 undescribed species are contained in the collection of the United States National Museum.

***ZACANTHOIDES IDAHOENSIS*, Walcott**
M. Cambrian, Idaho.
"Milwaukee Public Museum Photo"

Many Lower Cambrian specimens have been found in New York, Vermont, Pennsylvania and Nevada. The same thing is true of the Middle Cambrian of Massachusetts, Idaho, Utah, Nevada and Canada. The Burgess shale fossil locality, discovered by Walcott, on the slopes of Mt. Wapta, 3000 feet above the town of Field, British Columbia, threw much light on Middle Cambrian fossils. This shale is about seven feet thick, and the marvelous preservation of all fossils within it, has revealed much on the nature of trilobites. Vermont, Wisconsin, Missouri, Tennessee, Alabama, Texas, Nevada, British Columbia and other American localities produce Upper Cambrian fossils. Wisconsin is noted for Upper Cambrian fossils in the Franconia, Trempealeau, and Dresbach sandstone formations located in the Eau Claire area.

There was very little disturbance during the 105 million years of the Cambrian Period, and that which occured at its close eased the trilobites over into the Ordovician period as still dominating the scene. We will meet them there in the next article.

The intent of this article is to make the picture as clear as possible so the amateur reader will be encouraged to do research work on his own. The inclusion of this glossary will be of great help.

TRILOBITA GLOSSARY

Annular (annulations)—Ring shaped

Anterior—In front.

Axial furrows—Furrows or depressions bounding the axial or median longitudinal lobes of trilobites; dorsal furrows.

Axial spine—Spine extending from thoracic segments.

Cephalon—The head of trilobites.

Cheeks—The two lateral portions of the head or cephalon of the trilobites, divided into fixed and free cheeks by the facial suture.

Cranidium—The portion of the head or cephalon of the trilobites lying between the facial sutures, comprising the glabella and the fixed cheeks.

Eye lobes—Lobes of the fixed cheeks within the inner margins of the eyes. The palpebral lobes.

Fixed cheeks—The portion of the cephalon or head lying between the glabella and the facial suture.

Free cheek—Lateral portion of the cephalon or head of the trilobite, lying between the facial suture and the lateral cephalic border.

Furrows—Grooves or narrow depressions.

Genal spines—The posterior prolongation into spines of the genal angles of trilobites.

Glabella—The central axial portion of the cephalon or head of trilobites.

Hypostome—The under lip of trilobites.

Plurae—The two lateral longitudinal lobes of the trilobites, applied chiefly to the thoracic region and the pygidium.

(Concluded on Page 25)

EARTH SCIENCE

Human happiness depends chiefly upon
having some object to pursue
and upon having the vigor which our
faculties are exerted in the pursuit.

— Joseph Priestly,
Preface to history of electricity.

A knowledge of earth science is a valuable asset to anyone. It provides a valuable background for the fuller appreciation of all other sciences. It creates consciousness of man's dependency upon earth materials and an understanding of their economic and political significance. One becomes aware that the existence, comfort, happiness and progress of civilization depends upon the way in which the earth's resources are utilized.

The earth is an integral part of the universe, a planet of astronomical importance. Principles of chemistry and physics have been developed through the study of earth materials. Modern industries of every description depend on raw earth materials in some form for fuel, fabrication, or construction or upon favorable geographic location for successful operation.

There is a close relationship between the botanical and biological sciences and geographic conditions. Both flora and fauna of any region are governed by the soil and climatic conditions that are prevalent. The farmer, too, depends upon the fundamental qualities of the soil and favorable climate for successful harvest.

Commercial trade routes (highways, railroads, waterways, and even airways) depend upon the geographical influence or proximity of the earth's resources (mineral, animal, or vegetable) and the favorable location of fuel or power (water power) and markets. The airplane is revolutionizing the location of many trade routes and developing new ones, but the relocation is influenced by climatic conditions and are largely controlled by geographic conditions and regional topography.

Natural geographic boundaries often mark political boundaries. Rivers separate counties, states or nations. Mineral wealth or possession of navigable harbors may create jealousy among neighboring nations. An understanding of these factors is helpful in promoting the establishment of world peace.

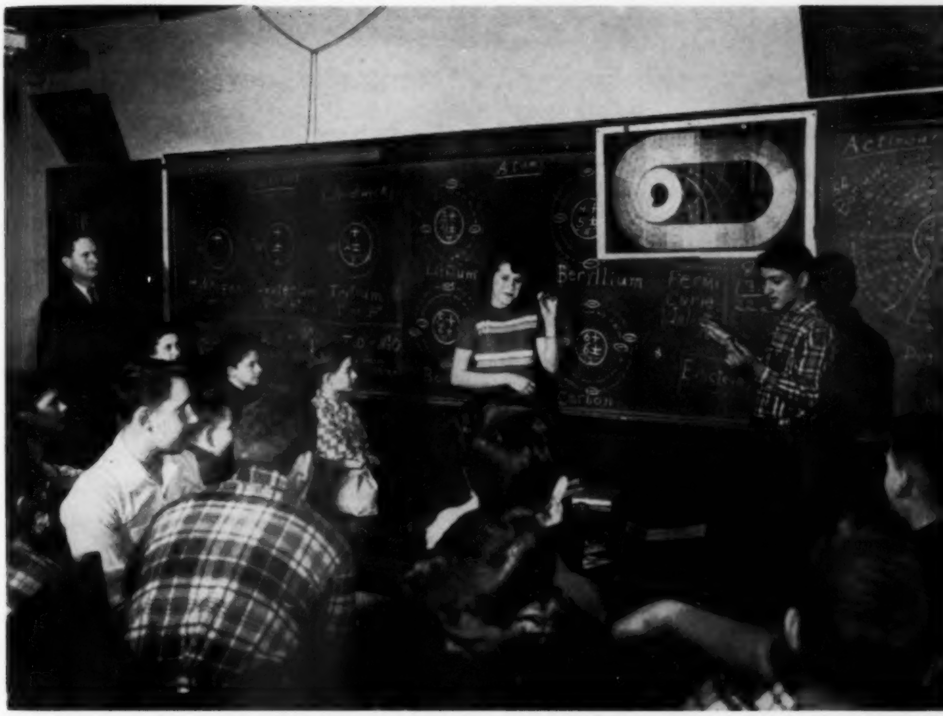
Earth Science is also a valuable cultural study. No intelligent traveler can help but have a better appreciation of the scenic panoramas, the majestic mountain ranges or mirrored lakes, if he has even a small conception of how they came into being. The collecting and study of minerals, fossils and rocks provides a satisfying hobby for countless thousands in all walks of life.

Ward's Natural Science Bulletin

IN THE HIGH SCHOOLS

For more than half a century the Joliet High School and Junior College, has maintained an outstanding Earth Science Department, which has served as a model for many schools throughout the country. Here, in Room 199, fifty years ago, was established the pioneer Earth Science laboratory to be set up in any of the Secondary Schools of America. Ever since, without interruption the subject has here been taught as a laboratory science and so accredited and approved by the North Central Association.

Insofar as Secondary Schools are concerned, the Joliet department for the past quarter of a century has been an oasis of



Class Room Scene in the JOLIET TOWNSHIP HIGH SCHOOL. Instructor Noble Benjamin looks on while interested pupils discuss the intricacies of the atomic structure. Photo by Leatsler.

Earth Science instruction in an almost barren desert. Happily now the tide has turned and each year trainee teachers from normal schools are practicing here, to go out and fill positions to meet the growing demand for the subject. The work of the department now requires the full time of some eleven or twelve teachers, eight of whom are needed constantly to handle the thirty sections of Earth Science now running concurrently to take care of the entire freshman (9th Grade) class, of whom it is a required subject.

The department also handles all instruction in Geography in the High School and all Geography and Geology in the associated Junior College, which incidentally is the oldest public Junior College in America. The one semester enrollment summary of the classes handled over a five year period, as taken from the annual reports of the head of the department to the Superintendent's Office, are given in the following table:

Year	Earth Science H.S.	Geography H.S.	Geography College	Geology College		Total
1947-48	1628	427	72	335	(GI)	2462
1948-49	1664	270	53	224		2211
1949-50	1591	173	68	273		2105
1950-51	1453	317	120	272		2162
1951-52	1510	231	111	203		2045
Total	7846	1418	424	1307		10985
5-year av.	1569	283	85	261		2199

(This does not include enrollment in Adult Education evening school classes or classes in Photography handled by the department.)

Earth Science is taught as a two semester course requiring one full year, the course outline being broken down into six major units, given under the following headings: The Atmosphere; The Lithosphere; Mapping and Conservation; The Earth as a Planet; Elements of the Weather, and the Changing Earth and Atomic Energy. There are six weeks of instruction in each unit, which are further broken down into from twelve to fifteen individual problem exercises covering the field. The class room picture shown is typical of the instruction given and the interest shown by the pupils.

WHO WAS THIS HORATIO ALGER BOY

OF THE MINING INDUSTRY?

(PRIZE QUESTION FOR MARCH)

Altho the history of America is replete with stories of hundreds of poor boys who later attained both fame and fortune, perhaps none is more startling or romantic than that of an Iowa country lad, who before the days of the "War between the States," started off to college with only about $12.00 in his pockets, and an old knocked down buck-saw in the bottom of his trunk, hoping therewith to be enabled to earn at least a bare subsistence while getting an education.

When the War broke out, it is said that every boy on the campus enlisted in the Union Army, save three, one a cripple, another who had lost his "trigger finger" by accident in a buzz-saw, and the third, the subject of this sketch, who had "lung trouble." Not being able longer to bear the stigma of remaining on the campus with only girls about him, he withdrew from school and pulled out for the West (Denver), where he hoped that he might be of some service to his country.

Benefited by the climate no doubt, his health improved, and being a farm boy and familiar with the use of horses he started teaming throughout the country round about. When a gold rush was on one summer, he did a "rushing business," picking up several hundred dollars profit during the season, hauling supplies out of Denver to a mining camp in the mountains some distance away.

As the season closed in the fall, for some reason he chose to remain at the camp. There being several families present with children, it was thought that school should be held during the winter and so an abandoned cabin was chosen located somewhat out of the way, around on the back side of the mountain. Being about the only person in camp with sufficient education to "hold school" he was selected to do the job of teaching.

When the weather permitted the teacher often took a short cut home in the evening, up over the mountain and down through a "draw" or ravine. One day in the spring of the year, seeing some flowers which were particularly attractive, up sort of a gully, he detoured from his beaten path to get a better look at them. Coming back down again, watching his steps, carefully, he kicked up a stone which seemed unusually pretty. Putting it in his pocket, he carried it home and placed it on his table.

Seeing it daily and often toying with it in his hands, memories went back to things he had seen in his old mineralogy class in his college days in Iowa. Suddenly it came to him, that this might be the ore of some valuable metal, and after carefully verifying his suspicions he went out and staked a claim on the location, and later taking his summer savings he bought several more. With this start he was able to develop the properties, this being the beginning of one of the greatest fortunes ever made up until this time in this country, and thus our sickly young college student who was rejected by the army on account of his poor health became very famous, and even to this day his name is well known in financial circles both at home and abroad.

Alert: One annual subscription to E.S.D. will be given the first person (earliest postmark) reading this story, who writes us such details concerning the feature, as the name of this young man and the location and nature of his claims, also something of the time and circumstance concerning the mining operations herein described. This information will be published and the subscription credited to advance, or, to any other person designated by the winner.

Mail to the Editor

Complete your files of the Earth Science Digest now. See List on Page 38

"PLACER MINING ON THE ZUMBRO"

(Answer to our November Prize Question)

To Dr. C. R. Holland, of Rochester goes the credit for answering the question "Where was this Pioneer Gold Mine," in southeastern Minnesota, described in our November issue.

Dr. Holland writes, "These gold sands were located at Oronoco, Minnesota, on Highway No. 52, between two branches of the Zumbro River, which at this location become confluent and pass over the Oronoco Dam."

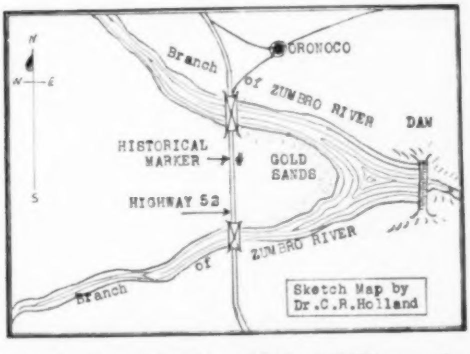
The "Gold Sands" were worked around 1857 and the approximate site is now marked by a Minnesota Highway "Historical Site" marker. The accompanying sketch map will show their location.

Among the earlier newspapers of Minnesota was the Mantorville Express, copies of which, fortunately, are still extant. In the issue of March 26, 1953, the following most interesting quotation was made, taken from an item published in their issue of July 3, 1858. Quote:

"The gold excitement seems to be unabated. The prospecting continues, and new discoveries have been made at various points on the Zumbro. The Rochester Democrat also says it has been found in the banks of Cascade Creek, near that place. Below Oronoco, we are told, that the stream has been turned from its bed several places, and that several hundred men are engaged in the search; and that some at least succeed in making it pay."

Minnesota Geological Survey Marker Located on U. S. Highway #52. Photo by Dr. C. R. Holland.

Considerable might be said concerning the geological origin of the gold in these Minnesota sands, traces of which may be found in most stream beds of the region, with more or less higher concentrations in pockets, but the simple consensus of opinion seems to be that their source is in the disintegrated St. Peter's sandstone so prevalent throughout the area. Certainly it could not be in the local limestones which are well known to be of an entirely different origin. While it might not be impossible, it is not believed to be present in quantity at least, in any of the so called "hard rock" found below.



Sketch Map Showing GOLD SANDS on the ZUMBRO RIVER, (Minn.).

WHERE THE CARDIFF GIANT RESTS

(Answer: Prize Question for January)

Judging from the response concerning the final resting place of the Cardiff Giant, we venture that there is just about as much interest now being taken in this, the greatest scientific hoax (aside from the flying saucers) of all time, as ever.

At least a dozen answers, all correct, were received, the first to arrive coming by air mail from Mr. Harold L. Lerch, of Vallejo, California, who by reason of his promptness will receive one year's advance to his Earth Science Digest Subscription. Congratulations Mr. Lerch.

We also take pleasure in quoting two paragraphs from a letter received from David E. Jensen of Pittsford, New York, which give important details that may be helpful to any who may be interested in viewing this venerable old codger.

Quote: "At present, the 'Cardiff Giant' rests beneath a shed on the grounds of the Farmer's Museum at Cooperstown, New York. My wife and I stopped to see it about two years ago. The Farmer's Museum is operated by the New York State Historical Society, primarily to preserve and display the early agricultural implements used by farmers of this state. In addition to farm implements, early household utensils are also exhibited, their use being often shown by actual demonstration. For example, flax grown on the farm land owned by the Association, is actually processed, the linen thread eventually being woven into cloth.

"Anyone who is traveling from Buffalo to Albany, and has a few hours to spare, would be well rewarded by taking a short scenic drive to Cooperstown (about 10 miles south of Route No. 20, just east of Richfield Springs.)

Just across the road from the Farmer's Museum is Fenimore House, (the former home of the author, James Fenimore Cooper) also operated as a museum. The National Baseball Museum is also located in Cooperstown and is a veritable mecca for all baseball fans.

"A short ways from Cooperstown are the Howe Caverns and the Secret Caverns, two of New York States contributions to cave lovers."

(Finis Cardiff Giant)

(Continued from Page 16)

ties was an ideal time. They announced to the world that they had located a fabulous mine, discovered by their forefathers while drilling a well, and that they would share their treasure with all who would be interested, for a price. The suckers swallowed the bait and the money rolled in. A hole was dug, at about a 15 degree angle into the side of a limestone bank for publicity purposes. It is still there, extending into the hill about 50 feet and is now full of water. The ultimate result was that those responsible were hauled into court for fraud."

"This swindle was known as the 'Gainey Mine' and was located just down the road and to the right of the Whitewater State Park, near the little town of Elba. The early settlers of that region did not dig to granite or through much of anything for their water. Springs were and still are everywhere. That country, it is thought, was never glaciated and I have never heard of any hard-rock outcroppings down there. Quartz is out of the question. The limestone is not gold-bearing."

"This faked mine, it is said, never produced enough gold to buy that first very necessary installment on a free lunch, i.e. (a bottle of beer). Much of this information was furnished me by my good friends Walter Trapp and Dr. C. F. Holland, who know this country like a book."

(Finis Gainey Mine)

PALEONTOLOGY NUMBER

We occasionally receive letters asking for more articles on fossils. In recognition of these requests we are glad to be able to publish in this issue several excellent articles on this subject which we feel sure will be much enjoyed by our readers.

JOHN RUSKIN COMMENTS ON STONES
(1819-1900)

"There are no natural objects out of which more can be learned than out of stones. They seem to have been created especially to reward a patient observer. Nearly all other objects in nature can be seen to some extent without patience, and are pleasant even in being half seen. Trees, clouds, and rivers are enjoyable even by the careless; but the stone under his foot has, for carelessness, nothing in it but stumblings; no pleasure is languidly to be had out of it, nor food, nor good of any kind; nothing but symbolism of the hard heart, and the unfatherly gift. And yet, do but give it some reverence and watchfulness, and there is bread of thought in it, more than in any other lowly feature of all the landscape. For a stone, when it is examined, will be found a mountain in miniature. The fineness of Nature's work is so great that into a single block a foot or two in diameter, she can compass as many changes of form and structure, on a small scale, as she needs for her mountains on a large one; and taking moss for forests, and grains of crystal for crags, the surface of a stone in by far the plurality of instances is more interesting than the surface of an ordinary hill; more fantastic in form, and incomparably richer in color."

(Continued from Page 19)

Posterior—To the rear.

Pygidium—The tail or posterior region of the trilobite test.

Test—The hard outer covering of the trilobites.

Thorax—The central segmented region of the body of the trilobite.

Reference—
The Trilobite By Stuart Weller
Bulletin No. IV—Part II
The Natural History Survey
The Chicago Academy Of Science.
The Introduction to Geology
By William Berryman Scott Ph.D., Sc.D., LL.D.
The Macmillan Company.
Historical Geology
By Raymond C. Moore Ph.D., Sc.D.
McGraw-Hill Book Co. Inc.
Index Fossils of North America
Shimer And Schrock
John Wiley & Sons Inc.

ANSWERS: Test your knowledge. (Check the ones you have correct.)

a.—(1) Marcasite. An iron sulphide mineral, identical in formula to pyrite (FeS_2), but differing somewhat in its crystalline structure and other physical properties.
b.—(1) Drift. A general term used to indicate glacial deposits, those carried (or drifted) in by the glaciers.
c.—(1) Selenite. A variety of gypsum in crystals or crystalline masses, ($CaSO_4.2H_2O$), possessing lustre resembling moonlight, hence the name from the Greek, meaning moonbeams.
d.—(1) Fault. A crack or fissure in the lithosphere (the rock earth) caused by inequalities of pressure, usually showing some displacement of the members.
e.—(1) A calcium-magnesium carbonate, ($Ca.MgCO_3$), usually formed by the replacement of some of the calcium atoms in a limestone by those of magnesium, through the work of groundwater.
f.—(1) Placer. Sand deposits containing sufficient gold to be profitably worked by panning. Also used in connection with other metals of value.
g.—(2) Enhydros. Minerals, usually crystalline, containing water, and sometimes other fluids, entrapped within, forming bubblelike inclusions.
h.—(2) Hardpan. Tight clay masses often found in auriferous (gold) placers, or in glacial deposits which are difficult to excavate.
i.—(2) Iridescence. A rainbowlike play of colors, as in the mother of pearl, etc.
j.—(3) Centrosphere. The Earth's inner core, presumably composed largely of a nickel-iron admixture.
k.—(3) Isostasy.General equilibrium within the earth's crust, supposedly maintained by the yielding or flow of the rock material.
l.—(3) Nacre. Material which yields the play of colors, as on shells, usually aragonitic in composition and character.

Total—Score 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect.

"LET'S MAKE CHAINS!"—THE LINK THAT BINDS

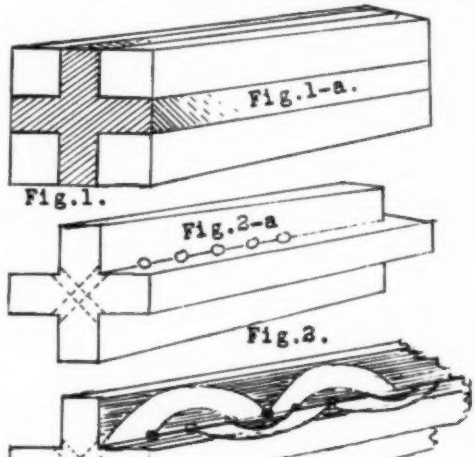
by Herman H. Hendrickson, Billings, Montana

If one is a glutton for work, (and some punishment), has oceans of time and an infinite amount of patience, then here is a project which once successfully accomplished will give him a lifetime of satisfaction and pleasure, and at the same time something which he will always be very proud to own.

The following notes describe my method of cutting link chains of jade, or other minerals, preferably of a toughish nature, in somewhat the same manner in which woodcarvers and just plain whittlers, have made them of wood for hundreds of years.

First I have (make) a perfectly square piece of Jade cut oblong about 5/8x5/8x2 1/16 inches*, (Fig. 1);—and then it must be marked as shown in Fig. 1a;—and next the corners cut out as marked, leaving an elongated piece, so shaped that a cross section (Fig. 2) resembles a perfect plus sign.

Then it must be drilled diagonally through the inside corners, to the opposite inside corner as indicated in Fig. 2a, and it is now ready for the critical step of milling as shown in Fig. 3, so that the links can be broken loose, and made ready for the final work of rounding and polishing them.



I found that my biggest trouble was the drilling process. It is easy to drill into a flat solid slab, but when I must drill into an uneven corner, or into a whole when the drill makes contact on such a small surface, (Fig. 4) it is almost impossible to apply the correct pressure to keep from tearing the drill tube.

Again when drilling the hole in the opposite side penetrating the first hole drilled (Fig. 5) it is most difficult to apply the proper pressure to the drill tube at the proper time. Here is where one actually experiences his greatest difficulty.

* Should one wish to make larger links these dimensions should be made larger accordingly.

Four links of jade chain made by Herman H. Hendrickson, Billings, Mont.

I make my own drill tubes, using a piece of a tin can and draw it through a draw plate, as this is the best material I can obtain for this purpose, and in that way I can make them just the size I wish. I nick the tube with a razor blade and then tap in diamond bortz.

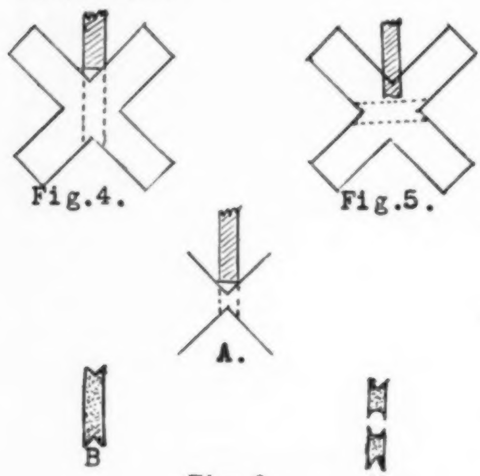


Fig.6.

Thus prepared,—this is the way I lick the drilling problem. I made an elevating table that I could place on the table of a drill press, which has a gear and belt to motor reduction. The motor which I took from an electric phonograph had a R.P.M. of 820 which I belted to about 6.6 to 1, to a double worm reduction which was 625 to 1 from the worm reduction which drives the screw elevator table with a 32 to the inch thread, raising the table 1/32 per screw turn.

At this ratio I get a $\frac{1}{8}$ inch feed in 20 minutes. This may seem very slow but it surely works swell. I can put my rock on the drill table, lower the Bortz loaded drill tube to the rock, lock it, put a drop of oil on the tube, start the drill on third drill speed, and then throw the switch on my elevating table, and let it go. In 20 minutes it is through $\frac{1}{8}$ wide or $\frac{1}{4}$ inch in 40 minutes. In this way the tubes last much longer, and Figure 6 A, B, and C illustrate what the drill cores look like. When drilling through a hole I get two cores as shown in C.

USUALLY OVERLOOKED

By Harry Adams

Many geodes are collected from the Mississippian strata in Illinois and neighboring states along the "Father of Waters." Many, too, are the uses to which they are put by the great variety of characters who lug them home. Least noble of all uses, perhaps, is their use as rock-garden ornaments or to line the driveways; sometimes with a hideous coating of whitewash. A real "rockhound" will study the different types of geodes gathered from the various localities and will also hunt for the different minerals to be found in them.

Of great interest, and of debatable origin are the doubly-terminated, free quartz crystals that can be found filling some of the bitumen bearing geodes from the vicinity of Niota, Illinois. It would seem that to be both doubly-terminated and free, in this material, the jell must have entered the opening with the bituminous material.

Having just about saturated the rock display and storage space in my basement a number of years ago, an idea presented itself to me that may have solved my problem. However, I did not follow it very far because I could not bear to discard even a single specimen that was already in the collection. The idea was great however, offering collecting potentials even to an apartment dweller. Why not collect just miniatures?

Some geodes collected around Warsaw, Illinois have Kaolin and/or calcareous filling in them. By subjecting this filling (powdery) to solution in dilute hydrochloric acid and repeated washing, I found that there was insoluble residue worth studying. By using a beaker for the washing process and reasonable care, not much small material will be lost. After the water has removed the most minute particles, examine the remaining materials under a good magnifying lens.

The residue contained many tiny Quartz crystals; which not many people ever see. These crystals offer the patient collector many happy hours of hunting on long win-

ter nights. Most of them are doubly-terminated and many are twinned. Some of these crystals are etched over their entire surface offering food for much thought. The writer found these crystals very abundant and much more perfect than many of their larger brothers.

A very good way to preserve and display the little fellows, usually about one-sixteenth of an inch long, is in a home-made mount using microscope slide glass and paper. Have black paper and white poster-board cut the size of the glass. Have the poster-board punched, according to your own ideas of needs and artistic taste, with holes from one-fourth to one-half inch in diameter. Glue one or more of the punched poster-board pieces together for each mount and glue them to one piece of the black paper, for the back. Cut pieces of heavy wrapping paper the size of the glass and glue one piece to the center of each piece of gummed paper which is cut large enough to pull up over the sides of the whole assemblage and glue on top of the slide glass with about one-eighth of an inch overlapping. This will permit the part of the mount which carries the specimens to slide in or out; make the gummed paper fit snugly so the mount will not slide apart without real pressure on the ends. This mount is excellent for keeping the little fellows in and also offers a convenient place for studying them under a lens. Once you try hunting the minute and *usually overlooked* specimens you will be tempted to carry a jeweler's loupe wherever you go rock hunting. I have heard you can sometimes find garnets in coal, but I haven't looked. There are many minute fossils that need a home too, and could well be handled to good advantage in a similar manner, which we will discuss later.

The "Meteorite" Bulletin of
Mineralorist Society of Joliet

Fig.1. BLACK CARDBOARD

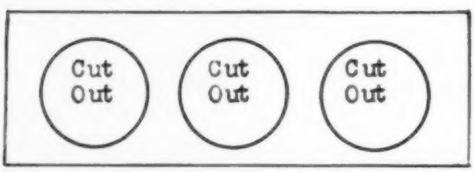


Fig.2. WHITE CARDBOARD

Fig.3. COVER GLASS

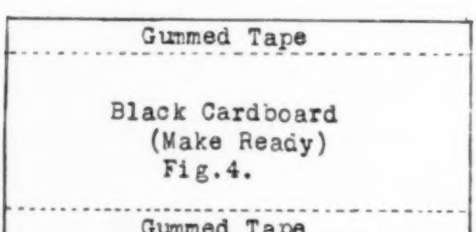


Fig.4.

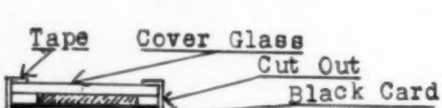


Fig.5. ENSEMBLE

SPECIFIC GRAVITY BEAKER WITH THERMOMETER

Russell A. Morley, Salem, Ore.

A suggested type of beaker for specific gravity determinations with the precision Jolly balance, having a permanently located thermometer, which facilitates the correct temperature recording of the immersing fluid, without disturbing the operation routine.

Specific gravity determinations made with a precision Jolly balance should always include the temperature in °C. of the im-

mersing liquid, so that the value of the specific gravity obtained can be reproduced by other workers when desired. This requisite condition has in the past, particularly in the fields of mineralogy and meteoritics, been almost entirely neglected, with the result that while the specific gravities assigned in most works are recorded to the second, or third decimal, and occasionally to the fourth, the temperatures at which these readings were obtained are not given. This fact gives little real scientific value to such determinations since they cannot be practicably reproduced even if the original specimen were at hand. The reasons for this neglect are doubtless several, among which the unwieldy use of a thermometer inserted into the mouth of the immersing beaker each time a specific gravity is taken is perhaps paramount. This problem is entirely eliminated by the use of the specific gravity beaker, with thermometer, which I have recently developed for this purpose.

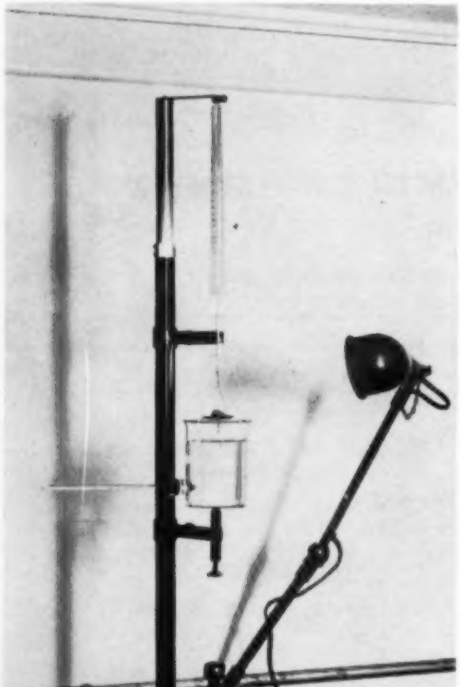


Fig. 1. Precision Jolly Balance with Specific Gravity Beaker.

The apparatus used (See Fig. I.) is composed of a 400 ml. capacity, Pyrex brand, Griffin beaker, low form, with an aspirator whose neck is tooled to take a No. 2 rubber stopper. The thermometer is a Taylor model No. 21140, etched-stem type, 210 mm. in length and 5.6 mm. in diameter, reading from $-10°$ to $+60°$C. in steps of 0.2°C. The thermometer is inserted in a No. 2 rubber stopper which is in turn forced into the mouth of the aspirator. The whole assembly is adjusted so that the thermometer's tip, which is covered with a piece of rubber tubing 2 cm. in length to prevent breakage, is located in the center of the beaker about 2 cm. from the bottom. The reading of the instrument may be greatly facilitated by the use of a thermometer reader.

BACTERIA MAKE IRON ORE
"Steel Facts"

To the layman there would probably seem to be nothing "deader" than a piece of iron or steel — witness the proverbial phrase, "as dead as a doornail." Yet these metals are very directly associated with a form of actual life—iron-depositing organisms which help to make some kinds of iron ore.

The best-known of the so-called iron bacteria and other organisms is the bacterium *Leptothrix ochracea,* which appears to be capable of self-nourishment on inorganic compounds. These microscopic "bugs" were busy in prehistoric times helping to form rich deposits of "bog" iron ore, or

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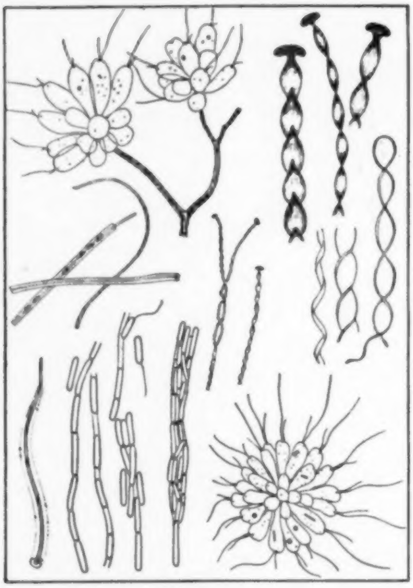
limonite, to be used by man millions of years later. They are still found today, although relatively scarce. Their importance to the iron and steel industry has greatly diminished, due to the fact that the nation's great ore deposits now in use were formed by other processes.



Various forms of iron organisms highly magnified

Bacterium Processes Iron

The leptothrix bacterium does not create iron, but "processes" it. Living in iron-containing water, it absorbs the iron from the water and deposits it as insoluble ferric hydroxide. This oxide forms an iridescent scum of ocher on the surface, familiar to everyone in wayside ditches. The oxide then sinks to the bottom, ultimately to form bog iron ore.

The use of simple ocher, like the bacterium itself, goes far back into prehistoric times, the earliest use being for decoration of the human body and other objects. When deposited in quantity as bog ore, it has been, and still is to a small extent, used as a raw material in iron-smelting. Such ore was used, for example, in the iron-works now being reconstructed at Saugus, Massachusetts.

Leptothrix Has Help

It will be seen from the above that bog iron ores are really so-called secondary ores, or produced from already existing iron; and that in their formation weather, water, and decaying vegetable matter also assist the little leptothrix in his work.

In addition to these bacteria, there are numerous other iron-depositing organisms, belonging to the flagellates (which are forms swimming with a fluttering or whip-like motion) and to the algae. These occur in a great variety of shapes. There is a loose analogy here to the familiar coral, in that the inorganic deposits or incrustations of these delicate organisms are far more noticeable and durable than the organisms themselves.

ICE CAVES IN THE UNITED STATES

During the last fifty years, the study of ice caves has been almost completely ignored. Much of the older literature is in need of restudy in terms of modern meteorological and speleological concepts. The number of ice caves known in the United States has increased paralleling the increased number of known caves of all types. With the asistance of many persons within and without the National Speleological Society the author has undertaken a two year study of the subject, including both those in the literature and those previously unreported, which study is now about two-thirds completed. Classification by types of caves and other underground sites and the special problems of each group are discussed. Information is presented on 166 caves or other sites to which the term "ice caves" has been applied. On eleven of these data is still lacking and would be welcomed. While the fundamental principles resulting in the formation and persistance of ice in caves are well understood, a number of interesting problems are presented.

Abstract: Paper presented at American Association for the Advancement of Science, Philadelphia, Pennsylvania. December 28, 1951.

—*William R. Halliday*

"MEET ME IN MILWAUKEE — MIDWEST MECCA IN '54"

With the joint meeting of officers of the Midwest Federation of Mineralogical and Geological Societies and of the Wisconsin Geological Society, held at the Hotel Wisconsin in Milwaukee on Jan. 23, the wheels of the '54 Midwest Convention officially started rolling toward its goal. It is to be held at the Civic Auditorium in Milwaukee on June 24-25-26.

With Midwest President, Herbert Grand-Girard, of Evanston, Ill., presiding, convention chairmen, appointed by General Chairman James O. Montague, reported on their labours to date. Chairman Oliver W. Lex of the Commercial Exhibits reported an enthusiastic and gratifying response from dealers reserving the available 28 booths.

Gilbert J. Thill, chairman of the non-commercial exhibits, is contacting all Midwest societies regarding space in Kilbourn Hall. All Midwest affiliates, and individuals with large collections, are invited to exhibit in the non-commercial hall. Special attention will be given to the "pebble pup" division, and the Juniors of WGS will set the pace with their own exhibit.

Two outstanding field trips are definitely on the convention agenda: a field trip to the famed Green Memorial Museum of Paleontology of Milwaukee-Downer College, and a visit to the popular Lutz quarry at Oshkosh, where superb marcasite, pyrite, calcite and sphalerite are found.

For those who desire a comprehensive impression of the convention city, interesting tours may be had to parks, the Washington Park Zoo, the Temple of Music, the new magnificent County Stadium, the "Home of the Braves," nationally famous industries, and those hops quarries which have made Milwaukee famous for its amber-hued "Gesundhite after Burpite." "Old World" eating places featuring good old "Appetite mitt Gemutlichkite yet" will have you leaving the '54 convention city drooling about Sauerbraten . . . Wiener-schneitzel . . . Pumpernickel . . . Apfel-strudel . . . Leberkloes! There goes your girth control along with the pause that refleshes!

So for a good time and a good convention — MEET ME IN MILWAUKEE — MIDWEST MECCA in '54.

Dr. H. W. Kuhm
Chairman, Publicity Committee

1954 CONVENTION AUCTION!!

HELP!! Help! Some one of our readers may be of great help to our Convention Auction Committee, in their efforts to contact the owner of some good mineral collection to be auctioned off at the Milwaukee Conclave in June. Perhaps you may know of a good collection belonging to an estate, or to some one who wishes to close out his specimens for one reason or another, and will write the committee concerning its owner and location. A generous split on the proceeds will be made between the owner and the Convention. Good individual mineral specimens, or small collections, will be very gratefully accepted as donations to the cause, if brought to the convention by the givers. Thanks muchly.

CELESTIAL SHOW

As an added post-convention field trip for the Milwaukee Convention Dame Nature is putting on for us one of the grandest shows of all times. A total eclipse of the Sun will occur on June 30th, passing across the northern border of Wisconsin, which will give our visitors a chance to witness a phenomenon which will not occur again in this region in their lifetime or in that of anyone now living. Plans will be made for those who desire to see it.

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1948

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1951

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1953

January—Unakite Granite of Virginia, by Dr. Waldo Jones. Famous Lost Mines, the Lost Chinese Rocker, by Victor Shaw. Studies in Coal, Part 3.

March—Atomic Research at Argonne Laboratory, by Robert B. Laraway. Lapidary Topics, Sawing, by William J. Bingham. Silver Islet, by Dr. Frank Fleener.

EARTH SCIENCE DIGEST

Box 1357 Chicago 90

OFFICIAL ORGAN OF MIDWEST FEDERATION

MIDWEST CLUB NEWS

Bernice Wienrank, Club Editor

AKRON MINERAL SOCIETY's president, Mr. M. F. Fraleigh, began an air trip on January 24 that will take him to Mexico, Guatemala and Columbia. He plans on searching for gems, crystals and minerals as well as sight seeing. One of the points of interest that he will visit is Lake Guatavita in the Andes mountains, where artifacts of the pre-Inca or Chibcha Indians have been found. On March 20 he is scheduled to give AMS a report on his trip and to show the group colored slides of the places that he visited.

AMS is planning to hold its fourth annual Rock and Gem Show during the latter part of April in the Akron Museum of Natural History. Last year the exhibit was viewed by more than 10,000 people and received much favorable comment.

WISCONSIN GEOLOGICAL SOCIETY, host for the 1954 Convention of the Midwest Federation, announces that its plans for the meeting are well advanced and include a trip to the famous Green Memorial Museum to view its superb paleontological display, a post-convention trip to the Lutz quarry for marcasite and pyrite specimens, as well as displays and lectures. The convention is to be held June 24-26 at the Milwaukee Auditorium. The official hotel will be the Hotel Wisconsin, 720 N. 3rd St., just four blocks from the Auditorium.

On Feb. 2 WGS heard Mr. Edwin E. Olson, certified gemologist, discuss "Creation and Appreciation of Gem Stones." His talk dealt with emeralds, sapphires and diamonds, and a comparison of synthetic sapphires being produced by Linde A with those being created in Germany today.

CENTRAL IOWA MINERAL SOCIETY on Jan. 8 gave an enthusiastic reception to a talk and demonstration on faceting which was presented by Don T. Sanders. Mr. Sanders also gave many tips on the construction of faceting equipment.

MICHIGAN MINERALOGICAL SOCIETY has elected John C. Thornton president for 1954.

"Fire Magic—the Science of Combustion," was the subject of an exciting demonstration and talk presented to MMS on Feb. 15 by Dr. Llewellyn Heard of the Standard Oil Co. The demonstration on fire required 18 feet of table space and 6 packing cases of equipment.

MINNESOTA MINERAL SOCIETY will feature the following lectures and speakers at its March and April meetings:

- Mar. 2, "Time Schedule of all Glacial Periods," Mr. Ara Rickmire.
- Mar. 9, "The Modern Pattern of Wind and Climate," Dr. John Borchert.
- Mar. 16, "Post-Glacial Changes in Climatic Patterns in the Northern Hemisphere," Dr. John Borchert.
- Mar. 30, "Earthquakes," Dr. Harold Mooney.
- Apr. 6, "Primary Structures in Determining Tops and Bottoms of Folded Sediments." Mr. Peter Miller.
- Apr. 20, "Oceanography," Mr. Dean Spilhause.
- Apr. 27, "Japan — the Old and the New," Dr. Henry Borow.

The meetings, which start at 7:30 p.m., will be held in the auditorium of the Minnesota Museum of Natural History. Visitors are cordially invited.

CHICAGO ROCKS AND MINERAL SOCIETY celebrated its eighth birthday on Feb. 13 with a gay party. A highlight of the evening was the showing of a color film on Navajo and Zuni handicrafts. This interesting film is a production of the Santa Fe Railroad.

CHICAGO LAPIDARY CLUB recently donated a trim saw to the veterans of Hines Hospital and is now collecting gem materials for them to work on.

The list of gem and mineral clubs that have made worthwhile contributions of equipment and materials to hospitals, schools and museums is an impressive one. An honor list of such clubs will be published in this department in the next edition of the *Earth Science Digest*. If your club should be included, please send details to the editor of this department.

INDIANA GEOLOGY AND GEM SOCIETY was scheduled on Feb. 12 to hear club president Francis Hueber speak on "The Amethyst." Mr. Hueber has been a rock collector for 13 years and has written several articles on gems, including one published in the *London Gemologist*. It was largely through the efforts of Mr. Hueber that IG&GS was organized less than a year ago.

CENTRAL ILLINOIS MINERAL SOCIETY had Dr. Ben Hur Wilson for their speaker, Sunday, February 7th. He first told of the Club and Federation movement in the United States, and following a brief question and answer period the Society voted unanimously to become an affiliate of the Midwest Federation.

The second and more formal part of the program was an intimate discussion of the Quartz Family Minerals, illustrated with hand specimens, and followed with Kodachrome slides of Arkansas Quartz localities shown by Harry Adams, representing the Joliet Mineralorist Society.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS, under the auspices of the Downers Grove Adult Evening School, is offering its members the following courses and lecturers:

Determinative Mineralogy — Dr. Frank Fleener

Geology—Professor Clarence Smith

Jewelry Making—Mrs. Hans Gutekunst

Courses dealing with the various phases of the earth sciences have long been a popular feature of ESCONI.

MINNESOTA MINERAL CLUB on Feb. 17 viewed two excellent films, "A Diamond is Forever," and "Crystal Clear." The first film was supplied by the De Beers Co. and the second by the Bell Telephone Co.

MMC meets the 2nd Saturday of each month, November through April, in St. Paul's new YMCA building, 1761 University & Wheeler. Meetings start at 8 p.m., with visitors welcome.

EVANSVILLE LAPIDARY SOCIETY was one year old on January 30. The group can point with pride to its many accomplishments during its first year, including the publishing of an outstanding society bulletin, establishment of its own lapidary shop and consistently fine programs on subjects of lapidary interest.

The MINERALORIST SOCIETY OF JOLIET at their January meeting heard Mr. Harry Adams instructor of geology in the Joliet Junior College tell of his experiences while attending the Air Age Education Work Shop at Boulder Colorado during the past summer. His theme the geologic history of the Rocky Mountain uplift was illustrated by many kodachrome pictures taken from the air.

THE OKLAHOMA MINERAL AND GEM SOCIETY has just issued a very attractive 1954 Year Book and Directory, listing current officers, and membership roll; also the entertaining host and hostesses for the year. The Year Book cover, especially designed, shows pictures in color, of a beautiful "barite rose," for which the State of Oklahoma is so famous. Mr. Chal D. Shyder, is the Club president and guiding light for the year.

THE MARQUETTE GEOLOGIST'S ASSOCIATION of Chicago, had for their speaker at the regular meeting on March 7th, Frank L. Fleener of Joliet, Illinois, who spoke on the subject of Carbon Dioxide.

This invisible gas of the atmosphere is one of nature's most important chemical compounds. It is essential to life on the planet Earth, and as a geologic agent it has wide and various influences which affect every living thing. Thanks, Mr. Fleener for a very interesting talk.

NEWS OF OTHER SOCIETIES

COLORADO MINERAL SOCIETY recently heard club prexy William Hayward deliver an informative lecture on "The Hows and Wheres of Amazonstone Crystal Collecting." President Hayward pointed out that the reliable indicator of productive pegmatite pockets is graphic granite, not bull quartz.

CLASSIFIED ADVERTISING

Rate: Six Cents per word, per issue. Minimum, $1.00, payable in advance. No proofs or copies for checking are furnished. Introductory words will appear in CAPITALS. When additional capitalization is required, each such word counts as two words.

DELVERS GEM AND MINERAL SOCIETY is making plans for its annual spring show to be held May 8-9. DG&MS makes a field trip each month. January's trip was to Death Valley.

HUMBOLDT GEM AND MINERAL SOCIETY reports that the Tri-County Gem and Mineral Committee's plans for its three annual shows are well under way. This committee is made up of representatives of the Humboldt County Gem and Mineral Society and Del Norte County Rockhounds of California, and the Gem and Mineral Society of Brookings, Curry County, Oregon. It was formed for the purpose of holding gem and mineral shows in each of the home counties of its member societies. The Curry County show will be held in Brookings, Oregon, during the Azalea Festival of that city. Dates of the shows will be announced later.

OREGON GEM AND MINERAL SOCIETY recently was taken back sixty million years in time via a talk entitled "A Tree in Clarno Grew," by Lon W. Hancock. The talk dealt with the romance of geology. Mr. Hancock, 1953 president of OAM&S, on Feb. 27 received a special citation from the Oregon Academy of Science for his outstanding contribution to science during 1953.

SAN DIEGO LAPIDARY SOCIETY at its first meeting in January installed James Moore as president for 1954.

Edward Soukup has presented SDLS with the manuscript of an elementary faceting instruction book. The society is having the book copyrighted and is using it in its faceting class.

RAWLINS ROCKHOUNDS CLUB on January 12 elected Chris Larson as president for 1954. Although less than a year old, the club now has 104 members.

RRC has invited both the Rocky Mountain Federation of Mineral and Gem Societies and the Wyoming State Mineral and Gem Society to hold their 1955 conventions in Rawling (Wyo.). Efforts are being made to hold both meetings at the same time.

EL PASO ROCKHOUNDS passes along this warning: If you use a diamond saw, be on guard against those small diamond chips which are used to charge the blade, as they enter the skin without pain but later may cause a growth which is often malignant. A member of EPR had a couple of painful and serious experiences with these sharp, tiny, high-speed missiles. He urges: Have them removed as soon as they are noticed.

CLUB OFFICERS PLEASE NOTE:
Your Cooperation Solicited

* *Societies are urged to send reports of their activities to this department, c/o Bernice Wienrank, 4717 N. Winthrop Ave., Chicago, Illinois. Will all Club Bulletin Editors please see personally that our Club Editor's name gets on their mailing list promptly.*

MIDWEST BULLETIN ATTRACTIVE

Much credit is due to J. W. Pagnuco, 130 Vermont Avenue, Cincinnati 15, Ohio, for his very capable job of editing the December number of the Midwest Bulletin, sponsored by the Federation as an informative service to its affiliated Clubs.

The purpose of the Bulletin, which is issued periodically, and mailed to the Club Officers with a limited number for distribution, is to inform the members concerning the objectives and work of the Federation, and the various ways in which it can be of service to them. It helps us to get acquainted.

The December number has an attractive cover, with a map showing the location of the various Clubs throughout the Midwest, and eight neatly mimeographed pages of highly interesting reading matter. In all a very creditable job.

We cannot resist quoting the following from page three of the Bulletin, which we feel should be read carefully and posted on your Club Bulletin board.

TEN WAYS TO KILL A MINERAL CLUB

1. If the weather is bad don't go to the meeting.
2. If the weather is good, go somewhere else.
3. If you do go, be late.
4. When you do go, find fault with the officers.
5. Never accept an office or chairmanship. It is easier to sit back and criticize.
6. If you do get appointed on a committee, don't go to the meetings, and if you are not appointed, get peeved about it.
7. If opinions are asked, say nothing, but after the meeting tell how things should be run.
8. Do nothing more than you have to, and when others do the work gripe about how the work is being done by a clique.
9. Don't worry about paying your dues, but wait until you receive two or three reminders.
10. Don't bother about getting new members, but let the ones who do all the work do that.

—Rock Rustlers News

TEN WAYS TO STIMULATE A MINERAL CLUB

1. Attend meetings and bring guests.
2. Introduce guests and new members to the membership.
3. Contribute new and constructive ideas.
4. Get into the swim of things.
5. Accept an office and work on it.
6. Help the less experienced members.
7. Organize programs to meet the interests within the club.
8. Do not depend on outside speakers for all meetings.
9. Publicize your club.
10. Organize and execute one or more projects for the youth in your community.

—J. W. Pagnucco

RECOMMENDED READINGS FROM SOCIETY BULLETINS

"Looking at a Mineral Collection," by Stevens T. Norvell, January issue of *The Pick and Dop*. Three simple rules will keep you in good standing with your mineral collecting friends.

"Agate Eaters," by Harry Zollars, January issue of *The Voice*. A science fiction story for rockhounds.

"Geology From a Woman's Point of View," by Dr. Katherine Nelson, February issue of *The Trilobite*. Women have won a respected place in the field of geology.

"Amethyst," by Clarence LaReau, February issue of *Template*. Amethyst is the royal gem of the quartz family.

"Greenstone of the Maoris," by Nan Johnson, February issue of *Rock Rustlers News*. The Maoris today revere their jade as much as the ancient Chinese and the early Mayans did theirs.

The BOOK SHELF

A FIELD GUIDE TO ROCKS AND MINERALS, by Frederick H. Pough. Boston: Houghton Mifflin Co., 333pp., $3.75

A field guide is one of the most difficult of books to write. It must be correct, for it will be in print and in use for a long time; it must be concise and practical; it must be useful alike to the expert mineralogist, the advanced amateur collector and to the beginner. Dr. Pough, a former curator of minerals at the American Museum of Natural History in New York, and widely known both because of his many talks at mineral conventions and as consultant to the jewelry trade association, has met these complex conditions splendidly in his field guide.

He begins by making some general observations on collecting and collections and on equipment for finding and identifying minerals. This leads him into a discussion of American geology and into rock types and presently to the physical characteristics of minerals. An excellent chapter on crystallography follows, although it, alas, does not make the difficult subject as crystal clear as might be hoped. A chapter on testing methods and procedure, with emphasis on simplified identification through flame and bead tests and the ultraviolet lamp, makes the transition to the second major section — the description of mineral and rock species. This is compactly organized with sketches of typical and often a second type crystal for each species, and simplified descriptions of particular value in a guide intended for use in the field.

The guide, which is on pocket size, contains 254 photographs, of which 72 are in color. Considering the inexpensive format and the large edition, these are of satisfactory quality.

OUR NATURAL RESOURCES: by Morris M. Leighton, Chief: Illinois State Geological Survey. Information Circular No. 12. State of Ohio: Natural Resources Divisions of Geological Survey, Columbus, 1953.

A scholarly paper presented by Morris M. Leighton as the 1952-1953 Bownocker Lecture on the campus of Ohio State University, honoring the memory of the distinguished geologist and alumnus of the University, John Adams Bownocker.

In this lecture, *"Our Natural Resources, Their Continuing Discovery and Human Progress,"* Dr. Leighton in his characteristic meticulous manner traces the history of *Man's Long Early Struggle* through the dark ages, and the *Renaissance of Science*, to the *Birth of Geology and The Geological Profession.*

All progress that has been made up through the ages is largely a matter of cause and effect, and man's necessity has paved the way for his slow and ofttimes laborious advancement up the ladder of civilization.

There is fascination for me in the statement, he says, "Tell me what your resources are, and I will tell you what your society is." This historical sketch of the development of our State, and United States Geological Surveys, and their new important place in the economy of our nation, should be on the desk of everyone interested in our country's Conservational Welfare.

B.H.W.

MINERAL COLLECTOR'S GUIDE, by David E. Jensen.—Ward's Natural Science Establishment, Inc., Rochester 9, N.Y. $1.00 Postpaid.

A new informative publication, by David E. Jensen, Head of the Geology Department of Ward's Natural Science Establishment, has been prepared as a simple guide for collectors who frequently ask the question,—"I am interested in minerals, but am just beginning my collection and would like to know how to go about it?"

The answer to this question has now been published as a 36-page manual. A distillation of the methods of mineral collecting that Mr. Jensen and other experienced collectors have had to learn the hard way, this publication will save new collectors much time, effort, and unhappiness by guiding their beginning footsteps in the right direction, pointing out the important things that must be kept in mind, and showing pitfalls to be avoided.

In addition to serving the needs of the novice collector, this book should find wide application in elementary courses of geology and mineralogy. A student who equips himself with a copy of the *Mineral Col-*

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lector's Guide and acquaints himself with its contents before setting out on a field trip has already made a considerable advance. The instructor conducting field or collecting trips may find that the use of this book by his students greatly facilitates his task.

This guide book should be in the hands of every mineral collector, as well as all students of mineralogy, whether in school or at home who are interested in building up a set of ready reference minerals for study or for consultation. It would be of very special value for both Boys and Girls Scout Organizations who are working on collections for merits.

A PROEM—Paul A. Broste, Published by the author, $3.75.

Those who attended the American Federation of Mineral societies' convention in Milwaukee in 1950 will recall a display of spheres by Paul A. Broste was one of its cardinal features. The spheres, including several as large as a bowling ball, were arranged on a "tree" of welded steel shaped in the spirit of a tree in a Japanese print.

Mr. Broste, who is a Dakota wheat farmer, living in Parshall, N.D., pictures this "tree" and another one he has made subsequently in *A Proem*, which is an account of his hobbies—sphere making, painting, and the writing of poetry. In the color plates of his "trees" he displays a large number of the 370 spheres he has made, and he also shows some of his mineral specimens as well as a few of his paintings. Black and white illustrations show other minerals, including a magnificent section of Arizona picture wood.

Most of the book consists of Mr. Broste's poems and accounts of his life in a pioneer family that came from Norway to settle in the fertile but untamed Dakota plain. The poems, which have an easy swing, describe the hard conditions of pioneer life, which "ground their granite down to grit," the joy of life in the unspoiled country despite its rigors, and the religious faith that animated these pioneers and finds testimony today in their son.

AMERICAN CONVENTION

We are glad to be able to announce the dates of the American Federation Convention, which we have just received, to be held on June 11th, 12th and 13th, in Salt Lake City, Utah, with the Mineralogical Society of Utah serving as hosts for the Rocky Mountain Federation. It was here that the first organization meeting of the A.F.M.S. was held, and friends and delegates will be happy to return to the birthplace of the Federation.